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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/677,361	10/03/2003	Hiroshi Kameda	030673-168	9807

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EXAMINER

OKEZIE, ESTHER O

ART UNIT

PAPER NUMBER

3654

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/677,361

Applicant(s)

KAMEDA ET AL.

Examiner

Esther O. Okezie

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

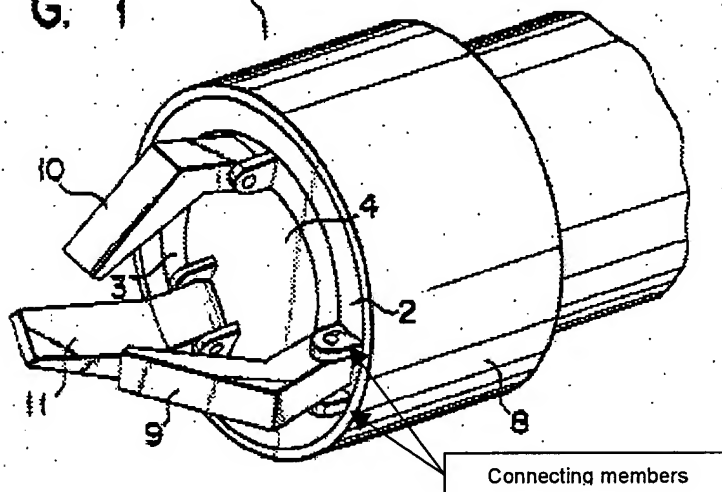
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Aomori.

Aomori discloses a robot hand including three fingers comprising: a mounting flange (inner cylinder casings 2a,3a,4a), an actuator (actuators 21,22,23) attached respectively to corresponding inner walls) attached to the mounting flange, a rotational output shaft (see figure 2A) of the actuator that passes through the mounting flange and projects in the forward direction, drive-side bevel gears () coaxially fixed to a tip portion of the rotational output shafts (column 2, lines 48-52: "The bevel gears 24,25, and 26, respectively mounted coaxially on the rotating shafts of the motors 21,22, and 23, which are fixed to the rotating members 2,3, and 4, respectively."), a pair of bearing housings (fig 2A boxed portions around bearings 5a,5b, 6a 6b) that extends in a forward direction away from a front surface of the mounting flange through positions on both sides of the drive-side bevel gear, bearings (5a,5b, 6a 6b) mounted in the bearing housings, joint shafts (see figure 2B horizontal shafts above bevel gears 24,25,26) rotatably supported at both ends by the bearings (see figure 2A), and aligned in a direction perpendicular to a center axis line of the rotational output shaft of the actuator, driven-side bevel gears

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(16,17,18) coaxially fixed on an external peripheral surface of the joint shafts, and engaged with the drive-side bevel gear (figure 2B), a connecting member (brackets at root of fingers) having one end fixed to the joint shaft, and extending in the direction perpendicular to the joint shaft, and a finger main body (9,10,11) connected to a tip portion of the connecting member.

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2. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Mimura et al.

3. Re claim 1, Mimura et al discloses a finger module of a robot hand comprising: a mounting flange (drive module 3 with outer case 24B), an actuator (drive motor 31) attached to the mounting flange ("The first drive motor 31 is constructed by an electric motor fixed in a rectangular relation to the outside wall of the upper part of the outer case 24B at the outside of the first link module." Column 5, lines 50-56), a rotational output shaft (see figure 3, shaft connected to drive motor 31 within first gear 32) of the actuator that passes through the mounting flange and projects in the forward direction, a

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drive-side bevel gear (32) coaxially fixed to a tip portion of the rotational output shaft (column 5, lines 56-60: "The second bevel gear 33 is fixed to the right end of the first joint shaft 1S, to which a rotating torque is transmitted by a first bevel gear 32 of a small diameter formed on the tip of the rotating shaft of the first drive motor 31..."), a pair of bearing housings (portion bearings 2A,2B, 23A,23B) that extends in a forward direction away from a front surface of the mounting flange through positions on both sides of the drive-side bevel gear, bearings (2A,2B, 23A,23B) mounted in the bearing housings, a joint shaft (1S) rotatably supported at both ends by the bearings (see figure 3, bearings 2A,2B), and aligned in a direction perpendicular to a center axis line of the rotational output shaft of the actuator, a driven-side bevel gear (33) coaxially fixed on an external peripheral surface of the joint shaft, and engaged with the drive-side bevel gear, a connecting member (T-shaped spline 34B with spline 34C, connecting the joint shaft 1S with the outer casing 24B of finger module) having one end fixed to the joint shaft (column 5, lines 61-68), and extending in the direction perpendicular to the joint shaft, and a finger main body (outer case 24B of finger module) connected to a tip portion of the connecting member (figure 3).

4. Re claim 3, Mimura et al discloses "a plurality of strain gauges 35 at a portion close to the fixed end of the outside wall of the flexible spline 34B" making it possible to detect any torque transmitted through the spline (column 6, lines 1-9).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over likura in view of Aomori. likura discloses a robot hand including two fingers (5 and 6) comprising: a mounting flange (drive tube 32), an actuator (linear actuators 34,35) attached to the mounting flange, a rotational output shaft (33) of the actuator that passes through the mounting flange and projects in the forward direction, drive-side bevel rack and pinion (25,26) coaxially fixed to a tip portion (26) of the rotational output shaft, a pair of bearing housings (fig 1B boxed portions around bearings 13,14,15,16,19, 20,23,24) that extends in a forward direction away from a front surface of the mounting flange through positions on both sides of the drive-side bevel gear, bearings (13,14,15,16,19, 20,23,24) mounted in the bearing housings, a joint shaft (3 and 4) rotatably supported at both ends by the bearings (see figure 1B; column 2, lines 20-30), and aligned in a direction perpendicular to a center axis line of the rotational output shaft of the actuator, a driven-side bevel gear (11,12) coaxially fixed on an external peripheral surface of the joint shaft, and engaged with the drive-side bevel rack (figure 2), a connecting member (auxiliary shaft 21 and end fasteners) having one end fixed to the joint shaft, and extending in the direction perpendicular to the joint shaft, and a finger main body (5 and 6) connected to a tip portion of the connecting member (column 2, lines 30-38).

likura does not disclose a drive side bevel gear driving the driven side bevel gears (11,12) of the joint shafts (3,4), instead a rack and pinion mechanism (17,18,25,26) that is connected to the drive shaft (33) of the actuators (34,35) is utilized to drive the driven-side bevel gears (see figure 2; column 2, lines 45-68, column 3, lines 1-25). Aomori teaches drive-side bevel gears (24,25,26), on the drive shafts of actuators of each of the three fingers, connected to driven side bevel gears (16,17,18). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the gearing mechanism of likura as taught by Aomori to replace the more complicated drive rack and pinion gearing with a singular drive bevel gear in order to "...provide a robot hand capable of stably grasping objects of various shape without requiring a further complicated structure" (Aomori 4,623,183: column 1, lines 37-43).

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mimura et al. in view of Langer. Mimura discloses the claim 1 but does not disclose a spring plate mounted on an external end surface of the bearings. Langer teaches a robot arm and wrist assembly wherein bearings (151,152) rotably support the joint or pivot shaft (153). A spring plate (160) is provided to bear against the bearing (152) in order to resiliently hold the shaft in place against the bearing "so there is no likelihood of increasing 'play' or looseness in the pivots of the arm structure" (fig. 10; column 6, lines 13-22; column 8, lines 41-59). It would have been obvious to one of ordinary skill in the art to modify the robot of Mimura et al as taught by Langer to include spring or flexure plates mounted on the bearings supporting both ends of the joint shaft in order to prevent the actuator from

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carrying external loads through the drive shaft ("The flexure plate prevents external loads from being carried through the actuator itself. The flexure plates isolate the actuator bearings from such loads and provide a zero backlash drive." Column 2, lines 12-20).

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aomori in view of Arbrink. Aomori does not disclose a joint shaft comprising a hollow shaft for wiring. Arbrink discloses a compact gear system intended for rotating the arm of an industrial robot. Arbrink teaches the eccentric shaft (21) is hollow "because it may be advantageous, particular in the case of industrial robot applications, to use the hollow shaft as ducting for electric cables, different media such as air, water and paint..." (column 1, lines 28-32). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the joint shaft of Aomori as taught by Arbrink to include a hollow portion for electric wiring because it would be advantageous in order to conserve space within a small area as would be needed for robot arms constructed to provide high torque via a compact gear system (column 1, lines 6-32).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aomori. Aomori discloses the claim 1 but does not disclose the duplication of the members of claim 1. It would have been obvious to one of ordinary skill in the art to duplicate these essential members along the finger for more versatile pivotal movement, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Esther O. Okezie whose telephone number is (571) 272-8108. The examiner can normally be reached on Mon-Thurs 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Katherine A. Matecki can be reached on (571) 272-6951. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EOO

A handwritten signature in black ink that reads "Kathy Matecki". The signature is written in a cursive, flowing style.

KATHY MATECKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600

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